

INTERNET AUTOMATIC ELECTRIC DATA SYSTEM

BACKGROUD OF THE INVENTION

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1.FIELD OF THE INVENTION

10 This present invention relates to an Internet automatic analyzing electrical data system, especially related to a system being able to inform the result to the clients through Internet automatically.

2. DESCRIPTION OF THE PRIOR ART

15 Because of Internet, the lifestyle has changed at an astonishing pace. It is much more convenient when we dealing with some routines. For instance, people gradually tend to write mails without pens and papers since using e-mail is much faster and cheaper than ever. There are
20 some other specific examples about the application of Internet in daily life, such as electronic bank, electronic commerce, Internet shop, reporting one's liable taxation on Internet, and etc.

25 Among them the electronic commerce plays a decisive role in enterprises. Since the efficiency is highly demanded, the tolerance of consuming time is greatly reduced. The real time communication property of Internet makes itself become an important way to improve
30 efficiency. Moreover, besides emphasizing the speediness of Internet, the enterprises are devoted to electronic inner control, and many important documents, data and messages have been stored in computers. Because these

computers and servers are connected by the intranet, if the internal information can be linked to external network appropriately, companies can save a lot of money for higher commercial efficiency. Hence, no matter in
5 electronic commerce or electronic inner control, the system integration is one of the essential targets.

By integrating the internal system of enterprises and the external Internet, electronic commerce can provide
10 prompt and perfect service. The speed of electronic commerce is much faster than that of traditional business, so it becomes popular soon after presented to the public. For service providers, the integration of inner system resource simplifies the operation procedure and reduces
15 the demand for human resource, and therefore saves a lot of money. Accordingly, not only the customers favor electronic commerce, but also the enterprises benefit from it, and this makes the spread of electronic commerce wider and rapider.

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Moreover, in order to ensure the electronic components conforming to electrical criterion, the electrical analyzing is adopted when developing products. The value of RLC (R : resistance, L : inductance, C :
25 capacitance) can be analyzing in early stages, and the optimization design can be obtained efficiently as well. Hence, the analysis of IC package is very important in the industry of semiconductor. However, the traditional way of entrusting analyzing wastes considerable time in the
30 process of data transmission and personnel handling. That reduces the whole commercial benefit.

SUMMARY OF THE INVENTION

The object of this invention is to provide an entrusting system for analyzing electrical data. The IC package information can be transferred through Internet, and the analyzing can be done and the clients can be informed with the result automatically because of system automation integration.

The present invention discloses an Internet automatic electrical data system that comprises a process controller used to process the analyzing order for IC packages entrusted by clients. A working database is used to store the input parameters of IC packages and a condition parameter database is used to provide the condition parameters relative to the model of IC package entrusted by clients. An electrical simulation and analyzing software are introduced to analyze the parameters input by clients and the condition parameters provided by the condition parameter database. A report form generator is utilized to generate the report form of analyzing result and a replying means is used to send the report forms to the clients.

This invention also discloses a method for automatic analyzing electrical data through Internet which comprises following steps: clients using web browser to input the IC package parameters for analyzing, and then the IC package parameters being transferred to a working database for storing through Internet. A process controller accesses the IC package parameters from the working database and condition parameters relative to the IC package parameters from a condition parameter database. The process controller transfers the IC package parameters and the condition parameters to an electrical simulation and analyzing software for simulating and analyzing. The electrical simulation and analyzing

software transfers the analyzing result to a report form generator for generating the report form of analyzing result. The report form generator transfers the report form to reply means and the reply means sends the report form to the clients.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG.1 is the block diagram of this invention ; and
FIG.2 is the flow chart of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

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The present invention discloses an Internet automatic electrical data system. It can accept the order of clients, and analyze the electrical property of input IC package parameters. All the processes are done automatically, that is, no employee is needed throughout the operation. Besides, the report form of result would be sent to the clients automatically. In this way, it can save the maximum time. The following is the illustration of the system of this invention.

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FIG.1 is the block diagram of this invention. Clients 100 use a web browser to input IC package parameters and transfer them to the working database 101 of this system through Internet. The input IC package parameters comprise the number of I/O terminals, package type, number of the substrate layer, substrate thickness, information about lead frame, and frequency. The system of this invention provides various IC package types, which

comprise BGA(ball grid array) , BCC, QFP, SOP, QFN(quad flat no-lead), Flip Chip, CSP (chip scale package) , and WLCSP (wafer level chip scale package) . When entrusting this system, the clients 100 would choose one of these IC package types.

The working database 101 stores the information about the IC package entrusted by the clients 100. A process controller 102 accesses the IC package parameters inputted by the clients 100 from the working database 101 and other needed condition parameters in accordance with the type of IC package entrusted by clients 100 from a condition parameter database 103. Because the number of IC package types depends on the content of the condition parameter database 103, the additions and deletions of the supported IC package types can be implemented by the modification of this database, even though the types available in this preferred example are BGA (ball grid array) , BCC, QFP, SOP, QFN(quad flat no-lead), Flip Chip, CSP (chip scale package) , and WLCSP (wafer level chip scale package) . Hence, those who are familiar with ordinary skills of this field would appreciate the modification of the IC package types and other parameters provided by the system would not affect the spirit and scope of this invention.

The process controller 102 transfers the IC package parameters entrusted by clients 100 and the condition parameters accessed from the condition parameter database 103 to a built-in electrical simulation and analyzing software 104 for simulating and analyzing. The electrical simulation and analyzing software 104 would construct a three-dimensional model according to the data

from process controller 102, and calculate the value of resistance (R) , inductance (L) , and capacitance (C) .

In this preferred example, the formulas for the foregoing RLC values are described as follows: $R = \frac{1}{\sigma \pi (\frac{D}{2})^2}$

$$(\Omega/mm) , L_s = \frac{\mu_0}{2\pi} \ln \frac{2H}{D} (H/mm) , L_m = \frac{\Phi_{12}}{I} (H/mm) , C_L = C_s + C_m$$

$$(F/mm) , C_s = \frac{\pi \epsilon_0}{\cosh^{-1}(\frac{2H}{D})} (F/mm) , \text{ and } C_m = C_L - C_s (F/mm) ;$$

wherein L_s is the self-inductance, L_m is the mutual inductance, C_L is the load capacitance, C_m is the mutual capacitance, D is the diameter, Φ_{12} is the magnetic flux, I is the electric current, σ is the conductance coefficient, ρ is the thermal resistance coefficient, μ_0 is the induction coefficient, ϵ_0 is the dielectric coefficient, and π is the ratio of the circumference to the diameter of a circle. The value of conductance coefficient, thermal resistance coefficient, induction coefficient, and the dielectric coefficient depend on the material of IC, and the ratio of the circumference to the diameter of a circle is a constant.

These obtained values are transferred to a report form generator 105, and the generator 105 would create a report form of result. This report form of result is transferred to a reply means 106, and the reply means 106 would send it to the clients 100 in e-mail through Internet. However, although the transmission way in this preferred example adopts e-mail, it is not a limitation, that is to say, other ways for communication, such as fax, can be included in the scope of this invention, too. Those who are familiar with ordinary skills of this field would appreciate the

modification the transmission way would not affect the spirit and scope of this invention.

FIG. 2 is the flow chart of the method of the present invention. Clients use a web browser to input the IC package parameters entrusted to be analyzed the electrical property (200) . The input IC package parameters comprises the number of I/O (input and output) terminals, package type, number of the substrate layer, substrate thickness, information about lead frame, and frequency. The foregoing IC package parameters would be sent through Internet to the working database 101 of this system for storing (201) . The process controller 102 accesses these IC package parameters from the working database 101 and other necessary condition parameters in accordance with the IC package type entrusted by clients from the condition parameter database 103 (202) .

In this preferred example, the supported IC package types comprise BGA (ball grid array) , BCC, QFP, SOP, QFN(quad flat no-lead), Flip Chip, CSP (chip scale package) , and WLCSP (wafer level chip scale package) . The function of the condition parameter database 103 is to store these necessary condition parameters of IC packages, and these condition parameters would be analyzed along with the parameters provided by clients. Those who are familiar with ordinary skills of this field would appreciate the additions and deletions of the IC package types supported by the system of this invention would not affect the spirit and scope of this invention. Hence, the enterprises can update the content of the condition parameter database 103 any time to meet the demand of industry, to follow the development of technology, and to reach the highest economical efficiency.

Sequentially, the process controller 102 transfers the IC package parameters from clients along with condition parameters from condition parameter database 103 to the built-in electrical simulation and analyzing software 104 of this system for simulating and analyzing (203) . The electrical simulation and analyzing software 104 would construct a three-dimensional model according to the IC package parameters from clients and condition parameters from condition parameter database 103, and calculate the value of resistance (R) , inductance (L) , and capacitance (C) .

The formulas for the foregoing RLC values in this preferred example are $R = \frac{1}{\sigma\pi(\frac{D}{2})^2} (\Omega/mm)$, $L_s = \frac{\mu_0}{2\pi} \ln \frac{2H}{D} (H/mm)$, $L_m = \frac{\Phi_{12}}{I} (H/mm)$, $C_L = C_s + C_m (F/mm)$, $C_s = \frac{\pi\epsilon_0}{\cosh^{-1}(\frac{2H}{D})} (F/mm)$, and $C_m = C_L - C_s (F/mm)$.

When the calculation is finished, the result would be transferred to the report form generator 105 of this system. The report form generator 105 creates a report from of result according to the analyzed data (204) . Thus report form of result is then transferred to the reply means 106 of this system (205) , and the reply means 106 applies e-mail to send the report form of result to the clients immediately and automatically (206) . The way to transfer report form of result in this preferred example adopts e-mail, but it is not a limitation, that is to say, other way for communication with the same effect, such as fax, can be included in this invention, too.

The foregoing steps are processed automatically by this system. From the clients inputting the order to receiving the report form of result, no employee is needed throughout the process. In this way, the speed to deal with the entrusting order would increase and the money for personnel can be saved, thus both the service providers and the users benefit from this invention.

10 This invention is described above, and those who are familiar with ordinary skills would appreciate the modification and revision without departing from the scope and spirit of this invention is acceptable. The protection range of this invention should obey the
15 following claims as well as its equal domain.